



US009636703B2

(12) United States Patent
Iwata et al.**(10) Patent No.: US 9,636,703 B2****(45) Date of Patent: May 2, 2017****(54) METHOD FOR FORMING COATING FILM AND COATED ARTICLE****C08G 18/792** (2013.01); **C09D 175/04** (2013.01); **B05D 1/04** (2013.01); **Y10T 428/31551** (2015.04)**(75) Inventors:** Naoyuki Iwata, Hiratsuka (JP); Fumio Yamashita, Hiratsuka (JP)**(73) Assignee:** KANSAI PAINT CO., LTD., Hyogo (JP)**(*) Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.**(21) Appl. No.:** 14/342,579**(22) PCT Filed:** Sep. 12, 2012**(86) PCT No.:** PCT/JP2012/073349§ 371 (c)(1),
(2), (4) Date: Mar. 4, 2014**(87) PCT Pub. No.:** WO2013/047209

PCT Pub. Date: Apr. 4, 2013

(65) Prior Publication Data

US 2014/0227534 A1 Aug. 14, 2014

(30) Foreign Application Priority Data

Sep. 30, 2011 (JP) 2011-216585

(51) Int. Cl.**B05D 1/36** (2006.01)
B05D 3/02 (2006.01)
C09D 175/04 (2006.01)
B05D 7/00 (2006.01)
C08G 18/62 (2006.01)
C08G 18/78 (2006.01)
C08G 18/79 (2006.01)
C08G 18/20 (2006.01)
C08G 18/22 (2006.01)
C08G 18/24 (2006.01)
C08G 18/26 (2006.01)
C08F 220/14 (2006.01)
C08F 220/18 (2006.01)
C08F 220/20 (2006.01)
C08F 230/02 (2006.01)
B05D 5/08 (2006.01)
B05D 7/06 (2006.01)
B05D 1/04 (2006.01)**(52) U.S. Cl.**CPC **B05D 1/36** (2013.01); **B05D 3/0254** (2013.01); **B05D 5/08** (2013.01); **B05D 7/06** (2013.01); **B05D 7/53** (2013.01); **B05D 7/532** (2013.01); **C08F 220/14** (2013.01); **C08F 220/18** (2013.01); **C08F 220/20** (2013.01); **C08F 230/02** (2013.01); **C08G 18/2063** (2013.01); **C08G 18/222** (2013.01); **C08G 18/227** (2013.01); **C08G 18/244** (2013.01); **C08G 18/26** (2013.01); **C08G 18/6254** (2013.01); **C08G 18/6291** (2013.01); **C08G 18/7831** (2013.01); **C08G 18/7837** (2013.01);**(58) Field of Classification Search**CPC **C08F 220/06**; **C08F 220/14**; **C08F 220/18**; **C08F 220/20**; **C08F 212/08**; **C08F 230/02**; **C08F 222/385**; **C08F 2220/06**; **C08F 2220/18**; **C08F 2220/1808**; **C08F 2220/1825**; **C08F 2220/1858**; **C08F 2220/1891**; **C08F 2220/325**; **C08G 18/2063**; **C08G 18/222**; **C08G 18/227**; **C08G 18/244**; **C08G 18/26**; **C08G 18/6254**; **C08G 18/6291**; **C08G 18/7831**; **C08G 18/7837**; **C08G 18/792**; **C09D 175/04**; **Y10T 428/31551**
USPC 428/423.1; 427/385.5
See application file for complete search history.**(56) References Cited**

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Primary Examiner — Thao T Tran

(74) Attorney, Agent, or Firm — Wenderoth, Lind & Ponack, L.L.P.

(57) ABSTRACT

An object of the present invention is to provide a method for forming a multilayer coating film, the method making it possible to obtain, with excellent curability at low temperatures and in a short period of time, a multilayer coating film exhibiting an excellent finished appearance. The present invention provides a method for forming a multilayer coating film, wherein a substrate is sequentially coated with at least one layer of one or more base coating compositions, and with one or more clear coating compositions, the method being characterized by utilizing a clear coating composition containing a hydroxy-containing acrylic resin (A) having a hydroxy value in a specific range; a polyisocyanate compound (B) having a viscosity in a specific range; and an organometallic catalyst (C) containing a metallic compound (C1) in which the metal is a member selected from the group consisting of zinc, tin, zirconium, bismuth, lead, cobalt, manganese, titanium, aluminum, and molybdenum, and an amidine compound (C2).

12 Claims, No Drawings